Amendment #3 - UPDATED
Solicitation NNC12442536Q
Automated Gas Management Panels

Since release of the RFQ, NASA GRC has received several questions. This document presents these questions followed by NASA answers. Note: This is the second posting of Amendment #3. The original posting has been deleted and this new one posted in its place to reflect updates to the Q&A. Please disregard the previous posting. Please see the following Q&A:

1) *Q - Section 4.1.7 indicates that two of the gas management panels will be mounted in existing government owned cabinets. Will the other cabinets be mounted into gas cabinets that will be procured outside of this RFQ or mounted in a gas room to a wall or other surface?*

   A – There are 4 government-owned gas cabinets. Either one gas bottle, or two gas bottles if two gas species are compatible, will be installed in each cabinet. That's why two gas management panels have to be able to fit inside one of the cabinets – one for each of the two gas species.

2) *Q - Section 4.2.1 lists the 6 main gas for which a gas management panel is required. What gas should be assumed for the 7th optional gas management panel?*

   A – It doesn't matter what the gas species is. The panels have to be interchangeable and able to be used with any of the gas species listed in the specifications.

   The bottom line is that the seventh panel is intended as a spare, and could be used with any of the listed gas species (or similar species if a different atmosphere is being simulated). Note that the required six panels, as the optional seventh panel, must be identical.

3) *Q - Section 4.2.2 indicates that the valves on the gas management panel will need to be actuated by a pneumatic pressure of 80-120 psig air, which is typical for a pneumatic valve that would be placed on a gas management panel. Section 4.2.2 further mentions that a solenoid valve should be able to be actuated by 120 VAC or 24 VDC. This seems ambiguous especially given that some of the gases are flammable. Please clarify.*

   A – The intention is to maintain a Class I division 2 classification for the area where the gas cabinets will be. It is the desire of the Government to have the panel design include 24VDC solenoid valves, as these can be used safely while maintaining the class I division 2 rating (see specification 4.3.7).

Furthermore, proximity-type limit switches (non-sparking) are desired to maintain the rating. Another possibility for limit switches is a sealed switch. No component of the panels can introduce a possible arc while operating.

Note that other similar installations at NASA GRC include 24 VDC actuated solenoid valves and 24 VDC proximity switches (for limits) within a Class I division 2 rated space.

4) *Q - Section 4.2.3 mentions a representative diagram but no diagram was found within the specification. Please provide diagram.*

A – No diagram was provided because the valve placement will depend on the vendor's design. Placement of all control valves, relief valves and sensors will vary from vendor to another.

5) *Q - Section 4.3.1 mentions type T thermocouples. Is there a location where thermocouples are requested to be used within the system?*

A – No thermocouples are required unless they will be used as part of the manufacturer's leak-checking algorithm or for other purposes. Any thermocouples that are included as part of the manufacturer's design must be type T per specification 4.3.1.

6) *Q - Section 4.3.2 mentions solenoid valves to be actuated by 24 VDC or 120 VAC. Is this part of the required equipment or optional?*

A – Solenoid valves may be actuated by either 24VDC or 120VAC, as the set of PLC output modules includes modules of both 120 VAC and 24 VDC outputs. It is the government's preference that they be 24VDC. However, the specifications don't preclude 120 VAC actuated solenoid valves.

7) *Q - Standard gas panels for dispensing the hazardous gases listed in the RFQ meet the requirements of the International Fire Codes and other applicable codes are presently engineered and offered as standard products. Safety analysis has been performed and CE marks are provided. Can these be offered? Due to the Hazardous nature of some of the source gases if control is provided by NASA will a waiver of liability for the operation of these systems be provided?*

A – The gas panels being purchased have to meet the specifications. They have to be automated by remote control (PLC) systems. They have to include leak checking, or at least be equipped to allow a leak detection

algorithm to be implemented in the PLC (pressure sensors and valving). The gas management panels being purchased must be furnished with a theory of operations with sufficient engineering detail to allow NASA engineers to program the operation for all modes of operation of the panels.

It is anticipated that no waiver of liability will be provided. The Government feels that the standard terms and conditions, specifically clause 52.212-4 section (p), already provided in the Solicitation are sufficient for the work being completed. 52.212-4(p) states "Limitation of liability. Except as otherwise provided by an express warranty, the Contractor will not be liable to the Government for consequential damages resulting from any defect or deficiencies in accepted items."

8) *Q - Significant savings may be relayed using an alternative PLC as it is a fully engineered system with existing software. Could this be offered in response to Option 2?*

A – Absolutely not. NASA engineers have an extensive supply of equipment, both for spares and expansion, of the Square M Modicon Quantum and M340 lines. In addition, NASA engineers have an extensive experience base with these systems, including site licenses of both PLC and HMI programming software. Any anomalies or non-standard behavior of the panels will be able to be quickly determined and corrected by NASA personnel with the use of Square D equipment.

Any savings that would be accomplished initially will most certainly be completely eliminated over the life cycle of the gas panels.

9) *Q - Specification 4.1.7 suggests that two of the gas panels shall be mounted in a Matheson 1170 gas cabinet. This gas cabinet is designed for manual and semi-automatic gas panels and does not have the height normally required to mount fully automatic gas panels without the regulator handles interfering with the cylinder valves. Will NASA consider the supplier pre-mounting the gas panel into a gas cabinet designed for a fully automatic panel that is approximately 4 inches taller? A typical two cylinder gas cabinet cost about $2,000.00. The saving in integration would probably off-set this.*

A – Ultimately, NASA will consider any proposal as long as it meets all specifications. NASA understands that various vendors will have unique methods of quoting on this procurement, which is why 'unique design methods' is considered a 'better value' criteria. The existing gas cabinets are already installed, bolted to the floor, and have water lines and vent ducting connected to them. Changing them out isn't a negligible undertaking, but, as the question alludes, might be considered in light of the costs of installing the

panels in the cabinets. It's unlikely to completely offset, though. In the end, if specifications are met, any proposed method will be evaluated. If the Government considers it valuable, it can be rated more highly.

10) *Q - Can we meet with NASA to review this requirement after bid submittal?*

A – NASA will not meet with any offerors until award is made. Once award is made, NASA would have no problem having a meeting with the Contractor regarding the work to be done.

11) *Q - I need clarification on the above mentioned Solicitation. Though the solicitation states that more details are available in section 4 – Specifications, I am not able to locate section 4. Can you help me find. I need the product details – part number, brand, manufacturer, etc.*

A – Section 4 is on page 6 of the Solicitation. A direct link to the Solicitation, along with all its attachments, can be found at https://www.fbo.gov/index?s=opportunity&mode=form&id=374adf8ea458521747cb03a18c6ab1a8&tab=core&_cview=1 .

12) *Q - Section 2 (bottom of page): Is the 'automated control system" part of the base effort or part of Option 2?*

A – The base effort is to supply 6 automated gas panels. This effort requires panels that can meet all the specifications as part of the base bid. The panels have to be able to be purged, vented, evacuated, and supply the gas species. They also have to be equipped with devices that allow for leak detection to take place (as specified).

Option 2 is to actually provide the PLC and HMI programming for the operation of the panels. This programming would include the code to implement the operations for each gas panel, as well as provide the leak detection and other functionality as detailed in the specifications.

13) *Q - Section 4.1.1: Is the vacuum pump existing? NASA should consider having the automated gas panel use a nitrogen-drive venture in lieu of the vacuum pump? Dilution of the process gas with the vacuum drive gas provides added safety to the effluent stream. This method is industry standard for UHP Hazardous Gas Cabinets.*

A – The vacuum pump is existing, and it has the ability to obtain a much higher level of vacuum than what could be obtained with a venturi pump (we assume that the question means "venturi" instead of "venture"). The high

vacuum level is required to guarantee the atmospheric constituents are at the correct levels.

14) *Q - Section 4.2.1: Flex hoses made with 316L are generally convoluted thin-wall SS wrapped in a SS wire-braid. The convoluted tubing entraps a significant amount of gas volume as compared to the gas panel itself. NASA should consider standard 316L SS ¼" tubing for the pigtail? This will reduce overall process volume by more than 70% and will provide a higher integrity and higher purity pigtail. This method is industry standard for UHP Hazardous Gas Cabinets.*

A – A standard pigtail is acceptable.

15) *Q - Section 4.3.1: What is the need for type T thermocouples?*

A - No thermocouples are required unless they will be used as part of the manufacturer's leak-checking algorithm or for other purposes. Any thermocouples that are included as part of the manufacturer's design must be type T per specification 4.3.1.

16) *Q - Section 4.2.6: The flow capacity requirement of 15slm must be prefaced by the desired delivery pressure and nominal source pressure. This information is necessary to calculate ensure the 15slm capacity.*

A – The delivery pressure has to be at least 100 psig. The 2000 psig bottle pressure will be regulated down to 150 psig, which would be the supply pressure to the panel.

17) *Q - Section 4.5.6: Please provide a sample of the code per your statement.*

A – Guidelines are as follows:

1) Variable names should be lowercase and separated by underscores if containing multiple words. Longer obvious words can be truncated.
Ex: test_variable, gauge_comm_in_progress, port_address

2) Structured text and function block diagrams (FBDs) are preferred. FBDs should be used in lieu of ladder logic.

3) The code must be implemented in a modular code design. The programming should implement small, simple derived function blocks (DFBs) to accomplish specific tasks. Nested DFBs are encouraged where commonly used functions can be encapsulated.

Ex: Read_Gauges_DFB has embedded within it the ASCII_Comm_DFB, which handles communication for a single device

4) Comments must be included, especially in the DFBs. Each DFB should contain the following comments:

Pre: (conditions for operation)
Post: (description of the state of the outputs after execution)
Purpose: (brief description of purpose of DFB)
Inputs: (input names, data types and descriptions)
Outputs: (output names, data types and descriptions)

5) Structured text, as opposed to function block diagrams, should be used for functions which are highly dependent on execution order. This is especially true if a function is implemented as a state machine (Unity structured text lends itself extremely well to state machines).

We will include a copy of example code in separate attachments. These attachments are titled "Code Screen Shot 1" and "Code Screen Shot 2".

18) *Q - Section 4.3.2: Are the solenoids part of the Base effort or Option 2?*

A – They are a part of the base effort. All specifications in 4.3 – Electrical are part of the base effort.

19) *Q - Section 4.5.2: Who is providing the PLC and touch panel? How many PLC's? How many touch panels? If these are provided by others, please tell us the exact configuration (this Modicon® unit can be different configs).*

A – The PLC and touchscreen are NASA-owned equipment. For the purposes of this procurement, there is one PLC with several remote drops. All PLC equipment is outside of the room housing the gas cabinets (and hence the gas panels).

There will be multiple HMIs, scattered in several locations. It is anticipated that each HMI will have identical programs, allowing operators to perform tasks from different locations. Note that usually two HMIs are installed side-by-side, allowing personnel to view data and control devices on the two pages. The PLC is a Modicon 140CPU65260.

20) *Q - General: The spec talks about the PLC, touch screen, solenoids and gas panels, but many items are not discussed. Some of these items include: power supply, ON/OFF button, electrical disconnect, EMO, CDA pressure switch, pneumatic valve lockout, fuses, electronics enclosure, gas leak sensors, etc.*

These are all features of industry standard has gas management cabinets. Is all of this control and wiring being performed by others, or are we to offer a turn-key controls package?

A – 120 VAC control power, 24 VDC control power, and 24 VDC instrument power are available for controlling valves, determining valve position, etc. The manufacturer's design may include pressure switches, gas leak sensors, etc. and the inclusion of these types of devices is to be determined by the manufacturer. The devices have to be wired to the terminals and connectors as described in section 4.3. Fusing will be performed at the PLC, i.e. outside of the gas cabinets, and thus will be performed by NASA.

It's best to consider the procurement a turn-key package that will be integrated into the facility. The panels supplied by the base effort (only) will be integrated into the facility by NASA personnel; this integration will include wiring the panels to the PLC, mechanical connection to the panels, writing the PLC and HMI code according to the manufacturer's documentation, and final end-to-end checkouts. If a manufacturer also supplies the option 2 effort, the PLC and HMI code supplied to the Government will be integrated into the existing PLC and HMI code by NASA personnel; thus the integration effort will be reduced to wiring the panels to the facility PLC, mechanical connections, and final end-to-end checkouts.

21) *Q - General: Would NASA consider an alternate proposal based on or standard fully-automated gas cabinet models (as long as the technical spec's would be met)?*

A – Ultimately, NASA will consider any proposal as long as it meets all specifications. NASA understands that various vendors will have unique methods of quoting on this procurement, which is why 'unique design methods' is considered a 'better value' criteria. In the end, if specifications are met, any proposed method will be evaluated. If the Government considers it valuable, it can be rated more highly.

Note that the cost to replace the existing, installed cabinets have to be considered if such a proposal is submitted (see question 9).